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Effectiveness of Financial Management and International Support for the Agricultural Sector

Hennadii Mazur*[1], Yusif Abulfat Humbatov[2], Volodymyr Shevchuk[3], Iryna Chychkalo-Kondratska[4], Maksym Chemerys[5]

[1]Department of Management and Administration, PHEE "Vinnytsia Academy of Continuing Education", Vinnytsia, Ukraine. Email: catanliliana82@gmail.com
ORCID: http://orcid.org/0000-0003-3123-841X
[2]Department of Organization of Tourism Industry, Azerbaijan Technological University, Ganja, Azerbaijan. Email: humbatovyus@gmail.com | ORCID: https://orcid.org/0000-0001-7902-9401
[3]Interregional Academy of Personnel Management, Kyiv, Ukraine.
Email: volshevchuk@gmail.com | ORCID: https://orcid.org/0009-0002-4456-7618
[4]International Economic Relations and Tourism Department, National University «Yuri Kondratyuk Poltava Polytechnic», Poltava, Ukraine. Email: irynachychkalo22@gmail.com
ORCID: http://orcid.org/0000-0003-3123-841X
[5]Department of Financial and Tax Law, State Tax University, & Judge Assistant, Northern Economic Court of Appeal, Irpin, Ukraine. Email: makschemerys@gmail.com
ORCID: http://orcid.org/0009-0002-4508-0350
Corresponding author

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Abstract

The study addresses the problem of low financial management efficiency in the agricultural sector, caused by market volatility, unstable economic conditions and limited investment resources, which undermines the stability and growth of enterprises. The relevance of this study stems from the need to enhance the effectiveness of financial management in the agricultural sector by analyzing key factors that influence financial stability, profitability, and enterprise development in the face of current economic challenges. This research aims to assess the effectiveness of financial management in the agricultural sectors of Ukraine, Poland, and Kazakhstan, with a focus on key factors that affect financial stability, profitability, and the development of farming enterprises in these countries. To achieve this goal, the study utilizes financial performance analysis, comparative analysis of financial strategies, a method for evaluating state support, analysis of investment activity, a systems approach, and economic-mathematical modeling using correlation analysis. The study showed that, despite its significant agricultural potential, the effectiveness of financial management in Ukraine is inferior to that of Poland, which benefits from integration into the EU, while Kazakhstan faces greater economic and technological limitations; increasing Ukraine's competitiveness requires targeted state support and the introduction of digital technologies.The practical significance of the study lies in the possibility of applying the obtained results to develop recommendations for improving financial management in the agricultural sector, in particular by optimizing state support mechanisms and introducing advanced technologies.

Keywords

Financial policy; Agricultural engineering; Agricultural research; Technical assistance; International cooperation

Introduction

Financial management is a crucial factor for the sustainable functioning of agricultural enterprises, which play a strategic role in ensuring food security, rural development, and economic stability. The financial resilience of these enterprises is critical amid macroeconomic instability. Shpykulyak *et al*. (2020) highlight limited access to credit and the need for efficient financial resource allocation as significant challenges. Moldavan *et al*. (2023) stress the role of modern tools, including financial technologies (FinTech), for quick capital access and risk minimisation.

The integration of the agricultural sector into global markets requires the adaptation of financial strategies that utilize innovative financing instruments and effective risk management. Myniv and Khrystenko (2024) confirm that active use of public and private financing mechanisms enhances productivity and market resilience. International financial institutions such as the World Bank, the IMF, and the European Investment Bank support agriculture through funding programs enabling production modernisation (Otoo, 2024). Digitalisation and FinTech development open new opportunities: blockchain, smart contracts, and agricultural receipts increase transparency and reduce risks (Sheyoputri, 2024; Shynkovych, *et al*., 2025).

Ivashkiv *et al*. (2020) emphasise that digital technologies improve the efficiency of financial operations, primarily through automation and risk monitoring. Ng'ambi *et al*. (2023) show that AI and big data enhance price forecasting, cost optimisation, and farmer incomes. Taking into account the above, there is a need for a study that, based on quantitative and qualitative analysis, would compare financial indicators and management approaches in the agrarian sectors of Ukraine, Poland and Kazakhstan, identifying the key factors of financial stability, profitability and development of enterprises in the conditions of modern economic challenges. This study aims to compare the effectiveness of financial management in the agricultural sectors of Ukraine, Poland, and Kazakhstan with a focus on factors influencing financial stability, profitability, and the development of agricultural enterprises in these countries. To achieve this aim, the following objectives were set:

- To analyze the impact of investment processes on the development of the agricultural sector in Ukraine, Poland, and Kazakhstan.
- To assess the effectiveness of state support for agricultural enterprises.
- To explore financing mechanisms and support tools for agricultural enterprises.
- To conduct a comparison of the financial strategies of agricultural enterprises to identify the most effective approaches to financial management in the sector.

The present study performs a novel approach by comparative analysis of investment processes and support mechanisms for the agricultural sector in Ukraine, Poland, and Kazakhstan, which enables the identification of specific features of agricultural enterprise financing. For the first time, the study analyzes the use of green bonds as a tool for financing sustainable development in the agri-sector. Additionally, investment barriers are identified, and mechanisms are proposed to overcome them in order to improve the investment climate in these countries.

Literature Review

Effective financial management is an integral component of the efficient functioning of enterprises in the agricultural sector, determining their profitability, investment activity, and ability to adapt to changes in the economic environment. Ostapenko (2021) views financial management as the process of planning, analyzing, and controlling financial resources to achieve sustainable development of enterprises. Mustafa *et al*. (2023) emphasize that the financial stability of an agricultural enterprise largely depends on strategic management of financial flows, investment attraction, and the use of modern financing mechanisms. Misiąg, Skica and Rodzinka (2020) highlight that traditional approaches to financial management, based on the assessment of liquidity and profitability, need to be supplemented with risk management tools and digital financial solutions. It is worth noting that financial stability is one of the key indicators of effective financial management in the agricultural sector. Zrybnieva *et al*. (2022) argue that the financial stability of agricultural enterprises depends on factors such as the level of income diversification, access to credit resources, and efficiency in cost management. According to research by Mang'ana, Ndyetabula and Hokororo (2023), the use of long-term financial strategies allows agricultural enterprises to reduce the impact of external shocks, including currency fluctuations, changes in global prices for agricultural products, and weather instability. Humeniuk *et al*. (2021) note that successful financial management should be based on a combination of traditional financial instruments (loans, subsidies, grants) and innovative mechanisms such as crop insurance and agricultural receipts. Investment capital plays an important role in the development of the agricultural sector, providing for the renewal of fixed assets, implementation of innovations, and expansion of production. Chen *et al*. (2021) emphasize that access to international financing contributes to increased productivity in the agricultural sector, allowing enterprises to use advanced technologies and adapt to climate change. Studies by Radchenko *et al*. (2020) confirm that state support in the form of subsidies and credit guarantees significantly boosts the investment activity of agricultural enterprises. At the same time, Levytska *et al*. (2022) note that private investors are increasingly focusing on the environmental aspects of agricultural production, particularly in financing sustainable agriculture through "green" bonds and ESG investing.

Modern financial technologies also open new opportunities for managing the finances of agricultural enterprises. Alieva *et al*. (2025) explore the impact of digital platforms on the efficiency of financial operations, highlighting that FinTech solutions simplify the processes of obtaining loans, risk insurance, and managing cash flows. Vanhuyse *et al*. (2021) point out that blockchain technologies enhance the transparency of financial transactions and minimize fraud risks. Research by Bobitan, Dumitrescu and Burca (2023) shows that the use of smart contracts in agricultural financing significantly reduces the costs of processing financial documents and promotes more efficient resource allocation. Significantly, the agricultural sector is traditionally associated with a high level of risk due to its dependence on natural and climatic conditions, market price fluctuations, and changes in government regulation. In this context, Humeniuk *et al*. (2021) state that effective risk management requires a comprehensive approach that includes crop insurance, income diversification, and the use of financial derivatives. Nguyen-Thi-Thuy *et al*. (2024) argue that the use of agricultural receipts and insurance products based on big data allows for minimizing financial losses of agricultural

enterprises. In turn, Omobitan and Khanal (2022) emphasize the importance of developing government programs for insurance and credit guarantees for small and medium-sized agricultural enterprises, which enables them to reduce financial risks and attract the necessary investments. Researchers emphasize that in the context of globalization, international cooperation plays an important role in enhancing the financial stability of the agricultural sector. According to the study by Sulimin, Shvedov and Larionova (2024), the participation of agricultural enterprises in international projects and programs allows them to gain access to innovative financial instruments and technical assistance. International organizations such as the World Bank, the International Monetary Fund, and the Food and Agriculture Organization of the United Nations (FAO) provide financial support in the form of grants, loans, and subsidies for the implementation of sustainable agriculture practices. Grants are an important source of financial support for the agricultural sector, especially in countries with transitional economies. According to the study by Gashi *et al*. (2024), grant funding contributes to the renewal of technical infrastructure, the implementation of environmentally friendly technologies, and the development of new areas of agricultural production. European Union (EU) programs such as Horizon Europe offer grant support for research and development of innovative solutions in agriculture.

Despite the significant volume of research, there are still unexplored aspects that limit the effectiveness of financial strategies for enterprises. In particular, international experience has not been sufficiently adapted to national realities, the impact of digital technologies on financial processes has been inadequately studied, and alternative sources of financing such as green bonds and crowdfunding have not been sufficiently addressed. Therefore, continued research will contribute to the development of more effective financial management mechanisms that will enhance the competitiveness of the agricultural sector at the international level.

Materials and Methods

Research Design

The study was based on a quantitative analysis of the financial indicators of the agricultural sector and an international comparison of financial management efficiency across three countries: Ukraine, Poland, and Kazakhstan. Statistical methods were used to assess the impact of financing on the economic outcomes of the agricultural sector and to identify key trends and risks in agribusiness financial management. These methods enabled the identification of relationships between financial variables such as investments, government support, enterprise profitability, and competitiveness.

Research Stages

The research consisted of several stages. The first stage involved a theoretical analysis, including a review of academic literature, international reports, and legal and regulatory documents to determine current approaches to financial management in the agricultural sector. The next stage involved the collection and processing of statistical data, including the analysis of financial indicators of the agricultural sector and the use of official data from international organizations and national statistical agencies. The following stage

was a comparative analysis, which examined financial management mechanisms in different countries, identifying effective strategies and their potential adaptation to national contexts. The final stage was a statistical analysis to evaluate the influence of financing, investments, and government support on the financial stability and competitiveness of the agricultural sector.

Collection of Data

The collection of data for the study was conducted to ensure a comprehensive analysis of financial management in the agricultural sector. It covered academic literature, official statistics, international reports, and regulatory documents related to finance, investment, and government support for agriculture. The primary sources were the State Statistics Service of Ukraine, the Ministry of Agrarian Policy, as well as international organisations, including the FAO, the World Bank, the OECD (Organisation for Economic Co-operation and Development), and the IMF (International Monetary Fund). The data covered the period from 2015 to 2023, allowing for the tracking of dynamics of changes before and after the COVID-19 pandemic, as well as in the context of current economic instability. The collection of information was carried out through content analysis, systematisation, and comparative review, as well as indexing by types of sources, periods, and regional affiliation.

Research Methods

Several methods were used to assess the impact of financial mechanisms on the development of the agricultural sector in Ukraine, Poland, and Kazakhstan. The first method involved analysing financial coefficients and conducting a comparative analysis, which encompassed indicators of profitability, asset profitability, investments, debt level, and liquidity. This approach enabled a comprehensive assessment of the financial condition of agricultural enterprises. Financial strategies and mechanisms of government support, such as subsidies, grants, and loans, were analyzed to evaluate their impact on business stability. Investment activity and its influence on economic performance were examined separately. A systems approach was used to conduct a comprehensive analysis of the interaction between financial factors, government support, and investment.

Economic and Mathematical Modeling of the Influence of Economic Factors on the Development of the Agricultural Sector

Correlation analysis was used to assess relationships, helping to identify the degree and direction of influence of such factors as investments, spending on technologies, government subsidies, and inflation levels on the performance indicators of the agricultural sector in the three countries: Poland, Kazakhstan, and Ukraine.

Research Sample

The study analyzed the agricultural sector in three countries: Ukraine, Poland, and Kazakhstan. The sample was formed based on key indicators of financial management efficiency and the agricultural potential of these countries, allowing for a comprehensive comparison and identification of major trends and differences. A stratified sampling

method was used, which made it possible to consider the specifics of financial management and the level of government support for the agricultural sector in each country. The selected sample is representative, as it includes three countries with different economic and financial conditions and encompasses key indicators that allow for meaningful conclusions about the effectiveness of financial management.

Results

The agricultural sector is one of the leading directions of economic development of Ukraine, Poland and Kazakhstan, providing significant export revenues and maintaining food security. The scale of state support, access to financial resources and the pace of implementation of modern technologies determine the level of effectiveness of financial management in this area. In Ukraine, the agricultural industry largely depends on external sources of financing, in particular, bank loans and investments. At the same time, a significant share of the shadow economy limits the possibilities of using official financial instruments. State support in the form of grants, subsidies and soft loans, as well as the rapid spread of digital solutions, in particular agricultural insurance, are of great importance. In Poland, thanks to its membership in the European Union, the farm sector receives stable funding within the Common Agricultural Policy, which ensures predictability of access to loans and subsidies. Systematic implementation of modern financial strategies contributes to increasing management efficiency and sustainable development of the industry. In Kazakhstan, despite significant land and natural resources, limited access to private capital and fluctuations in world prices for agricultural products make it challenging to modernise production and implement innovative technologies. However, state support remains a key factor in development (Table 1).

Table 1: Comparative analysis of financial management in the agricultural sector of Ukraine, Poland, and Kazakhstan

Indicator	*Ukraine*	*Poland*	*Kazakhstan*
State support	High but uneven	Very high (via EU)	High, with state control
Access to loans	Limited	High	Limited
Investment climate	Medium	High	Medium
Use of digital technologies	Developing	High	Limited
Export orientation	High	High	High

Source: Suieubayeva *et al*., 2022; Vanhuyse, Bailey and Tranter, 2021; Zalewski *et al*., 2022; Humenyuk *et al*., 2021; Ostapenko, 2021

Analysis of the agricultural sectors of Ukraine, Poland and Kazakhstan shows significant differences in their agrarian potential. Ukraine has the largest area of agricultural land — 42 million hectares, which is much larger than the areas of Poland (14.6 million hectares) and Kazakhstan (23.3 million hectares). This ensures a high level of grain production: Ukraine leads with 65 million tons, while Poland leads with — 30 million tons, and Kazakhstan leads with — 18 million tons. Regarding the export of agricultural products, Ukraine reached 23 billion US dollars. However, Poland is ahead with an indicator of 35 billion dollars, thanks to integration into the EU, and Kazakhstan exports only 5 billion dollars (Figure 1).

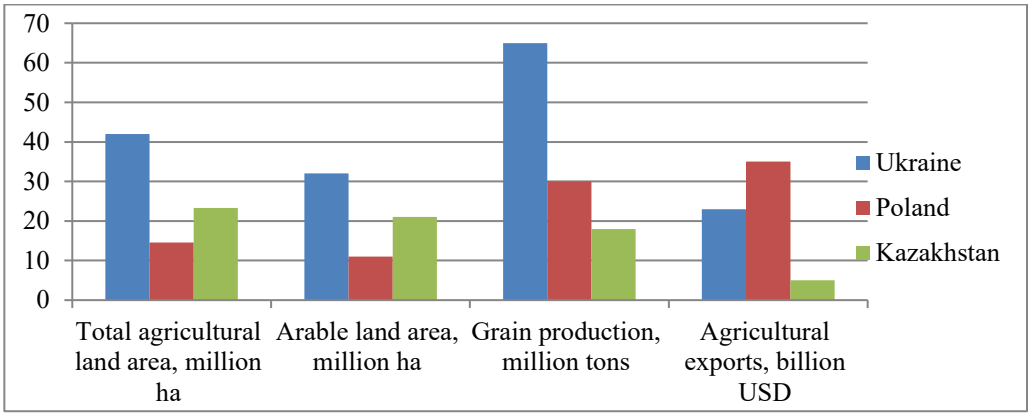


Figure 1: Agricultural potential by key indicators, 2024 [*Source:* Suieubayeva *et al*., 2022; Vanhuyse, Bailey and Tranter, 2021; Zalewski *et al*., 2022]

Farm structures vary significantly across Ukraine, Poland, and Kazakhstan. In Ukraine, the average farm size is 500 hectares, indicating medium-scale farming. In Poland, the average size is only 30 hectares, reflecting a large number of small and medium-sized farms. In Kazakhstan, the average farm size reaches 2,000 hectares, reflecting the dominance of large agribusinesses.

Labor productivity is highest in Poland ($25,000 per person) due to a high level of mechanization and technological equipment. In Ukraine, this figure is $10,000, and in Kazakhstan, $8,000, indicating lower efficiency. The level of mechanization in agriculture differs significantly among countries. Poland has 12 units of machinery per hectare, while Ukraine has 5, and Kazakhstan has only 3. This disparity in mechanization hampers efficient land use. In terms of wheat yield, Poland leads with 5.5 tons per hectare, followed by Ukraine at 4.2 tons per hectare. Kazakhstan's yield is much lower at just 1.25 tons per hectare, largely due to unfavorable climate conditions and lower levels of mechanization.

Table 2: Comparison of the agricultural sector across countries

Indicator	*Ukraine*	*Poland*	*Kazakhstan*
Average farm size, ha	500	30	2,000
Labor productivity in the agri sector, $/person	10,000	25,000	8,000
Agricultural machinery per 1 ha	5	12	3
Average wheat yield, tons/ha	4.2	5.5	1.25

Source: Suieubayeva *et al*., 2022; Vanhuyse, Bailey and Tranter, 2021; Zalewski *et al*., 2022

It is worth noting that international cooperation in the agricultural sectors of Ukraine, Poland, and Kazakhstan contributes to the development of financial management and increases the efficiency of agricultural enterprises. International organizations such as the World Bank, the Food and Agriculture Organization of the United Nations (FAO), USAID (U.S. Agency for International Development), and the European Union provide

grant funding, technical assistance, and knowledge exchange. Grants allow farmers to modernize production; technical assistance facilitates the introduction of modern technologies, while experience exchange provides access to best global practices. Notably, the "Agricultural Innovations" projects in Ukraine, "Financial Accessibility" in Poland, and "Sustainable Agricultural Development" in Kazakhstan have proven the effectiveness of such approaches.

Thanks to the support of international organizations, countries can adapt advanced solutions to local conditions and address key issues in the agricultural sector. For example, FAO projects in Ukraine helped increase crop yields by 25%; in Poland, USAID programs provided access to microloans for farmers; and in Kazakhstan, EU initiatives facilitated the adoption of environmentally friendly technologies. This cooperation strengthens the financial stability of enterprises and enhances their competitiveness in the global market.

To analyze the effectiveness of financial management in the agricultural sectors of Ukraine, Poland, and Kazakhstan in greater detail, key financial indicators are examined, allowing assessment of the stability, profitability, and support level in each country. The current ratio in Ukraine ranges from 1.2 to 1.5, indicating a moderate liquidity level that can cover short-term liabilities, though there is room for improvement. In Poland, this figure is higher (between 1.8 and 2.2), reflecting a stronger ability to meet obligations. Kazakhstan shows a ratio of 1.3–1.6, which is relatively stable but notably lower than Poland's.

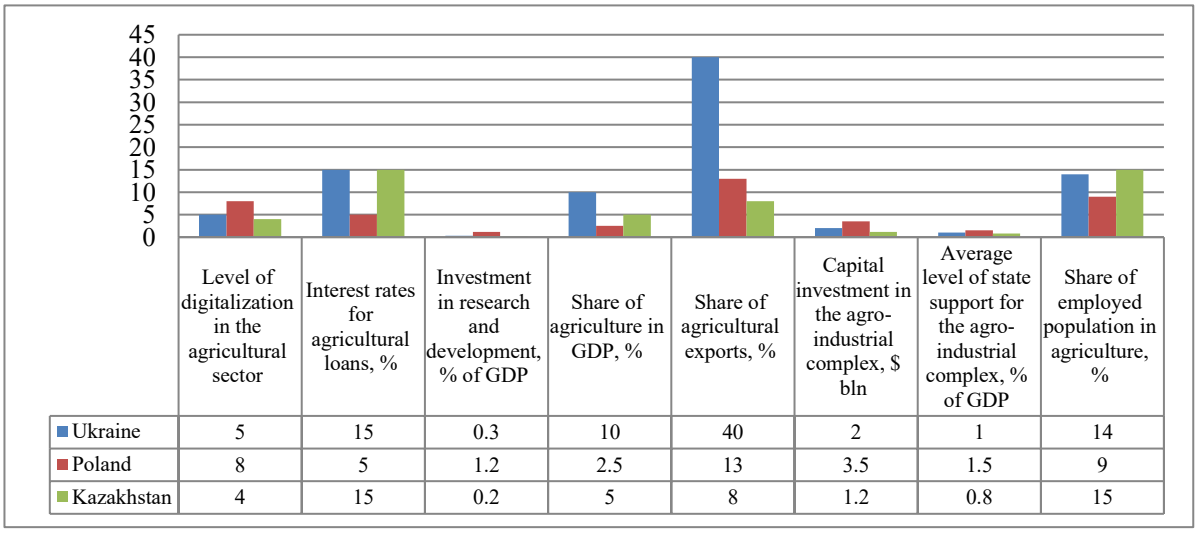
The share of loans in agricultural enterprise financing in Ukraine is 25–30%, reflecting limited access to credit resources. Poland has a significantly higher rate (40-45%) due to a more stable financial system and greater trust from banks. In Kazakhstan, the share of loans is 20-25%, indicating greater reliance on alternative financing sources. Return on assets (ROA) in Ukraine ranges from 3% to 5%, suggesting relatively low efficiency in asset use. In Poland, the ROA is 6-8%, reflecting more efficient resource utilization. Kazakhstan's ROA stands between 4% and 6%, which is average among the three countries. Profitability of production in Ukraine is between 10-15%, which is a relatively high indicator of product profitability. However, in Poland, this figure is even higher, ranging from 15% to 20%, indicating greater production efficiency. Kazakhstan demonstrates a profitability level of 12–18%, which can be considered average. State support for the agricultural sector in Ukraine amounts to 1.0% of GDP **(**gross domestic product), which represents significant support, though not the highest among the countries compared. In Poland, state support reaches 1.5% of GDP, providing substantial assistance to agriculture within the framework of EU policy. Kazakhstan has the lowest level of government support, at just 0.8% of GDP, indicating lower state involvement in supporting the agricultural sector. The share of agricultural exports in Ukraine is 40–45%, reflecting the importance of the agricultural sector to the national economy. In Poland, this figure is significantly lower (15–20%), which reflects a more diversified economy. Kazakhstan's share of agricultural exports is 35–40%, also pointing to the significance of agriculture in its foreign trade (Table 3).

Table 3: Effectiveness of financial management in the agricultural sector

Indicator	*Ukraine*	*Poland*	*Kazakhstan*
Current liquidity ratio	1.2–1.5	1.8–2.2	1.3–1.6
Financial independence ratio	0.4–0.5	0.6–0.7	0.5–0.6
Share of loans in financing, %	25–30	40–45	20–25
Return on assets (ROA), %	3–5	6–8	4–6
Return on equity (ROE), %	6–10	10–14	7–11
Profitability of products, %	10–15	15–20	12–18
State support, % of GDP	1.0	1.5	0.8
Share of agricultural exports, %	40–45	15–20	35–40
Cost of 1 ton of wheat, $	120–150	160–180	130–160

Source: Suieubayeva *et al*., 2022; Vanhuyse, Bailey and Tranter, 2021; Zalewski *et al*., 2022; Humenyuk *et al*., 2021

Thus, each of the three countries has its advantages and challenges in the financial management of the agricultural sector. Poland demonstrates high efficiency and stability, while Ukraine and Kazakhstan face limitations that require attention for improvement. Poland has the highest level of digitalization in the agricultural sector, which enhances efficiency and competitiveness, whereas Ukraine and Kazakhstan have potential for improving their technological base. Loan interest rates in Poland are significantly lower, easing access to financing, while high rates in Ukraine and Kazakhstan limit development opportunities. Investments in scientific research are also higher in Poland, contributing to the implementation of new technologies. The share of agriculture in GDP is highest in Ukraine (10%), while Poland (2.5%) and Kazakhstan (5%) show lower figures, reflecting different levels of dependency on the agricultural sector. Poland provides the highest level of state support for agriculture (1.5% of GDP), while Ukraine and Kazakhstan have lower levels (1% and 0.8% respectively).


45
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Level of digitalization in the agricultural sector
Interest rates for agricultural loans, %
Investment in research and development, % of GDP
Share of agriculture in GDP, %
Share of agricultural exports, %
Capital investment in the agro-industrial complex, $ bln
Average level of state support for the agro-industrial complex, % of GDP
Share of employed population in agriculture, %
Ukraine 5 15 0.3 10 40 2 1 14
Poland 8 5 1.2 2.5 13 3.5 1.5 9
Kazakhstan 4 15 0.2 5 8 1.2 0.8 15

Figure 2: Economic and investment indicators of the agricultural sectors [*Source:* Suieubayeva *et al*., 2022; Statistics Poland, 2025; Vanhuyse, Bailey and Tranter, 2021; Zalewski *et al*., 2022]

Overall, Ukraine demonstrates high indicators in terms of the share of agriculture in the economy and agricultural exports, but it requires more attention to digitalization and innovation investment. Poland leads in technological development and investment in agricultural science, while Kazakhstan occupies an intermediate position in most economic indicators. Economic-mathematical modeling has shown that investments in the agricultural sector positively affect its development in all three countries, with correlation coefficients ranging from 0.65 to 0.72. At the same time, food inflation has a negative impact (correlation coefficients from -0.60 to -0.68), indicating constraints on sector development due to rising prices. Expenditures on technology have a strong positive impact on the agricultural sector (correlation coefficients from 0.75 to 0.80), confirming the importance of investing in technological advancement. Government subsidies also showed a moderately positive effect (correlation coefficients from 0.50 to 0.58), although their role is less significant compared to other factors. High loan interest rates negatively affect the development of the agricultural sector (correlation coefficients from -0.65 to -0.70), limiting access to financing and investment (Table 4).

Table 4: Economic-mathematical modeling of the impact of economic factors on the development of the agricultural sector

Indicator	*Country*	*Correlation Coefficient (r)*	*Significance (p-value)*	*Impact on the Dependent Variable*
Investments in the agricultural sector (million UAH)	Poland	0.72	0.003	Positive, significant
	Kazakhstan	0.65	0.005	Positive, significant
	Ukraine	0.72	0.003	Positive, significant
Food inflation rate (%)	Poland	-0.68	0.004	Negative, significant
	Kazakhstan	-0.60	0.006	Negative, significant
	Ukraine	-0.65	0.007	Negative, significant
Technological expenditures (million UAH)	Poland	0.80	0.001	Strong positive impact
	Kazakhstan	0.75	0.002	Strong positive impact
	Ukraine	0.80	0.001	Strong positive impact
Government subsidies (million UAH)	Poland	0.58	0.015	Moderate positive impact
	Kazakhstan	0.50	0.020	Moderate positive impact
	Ukraine	0.58	0.015	Moderate positive impact

Cost of credit (%)	Poland	-0.70	0.005	Negative, significant
	Kazakhstan	-0.65	0.008	Negative, significant
	Ukraine	-0.70	0.005	Negative, significant

Therefore, the main factors that positively affect the development of the agricultural sector in Poland, Kazakhstan, and Ukraine are investments, expenditures on technology, and government subsidies. At the same time, food inflation and high interest rates on loans are limiting factors that negatively impact the agricultural economy. The study highlights the need to develop an effective financial strategy that takes into account both the positive and negative economic factors influencing the agricultural sector.

Discussion

The results of the conducted research highlight key aspects of financial management in the agricultural sectors of Ukraine, Poland, and Kazakhstan, revealing significant differences among these countries. The findings confirm the importance of government support, access to financial resources, and the use of new technologies in improving the efficiency of agriculture. However, substantial problems were also identified, particularly those faced by Ukrainian farmers in comparison to their counterparts in other countries. One of the main factors is the insufficient level of state support for the agricultural sector in Ukraine. Many farmers face limited access to subsidies and financial assistance, which restricts their development opportunities. This is also confirmed by studies from other authors, particularly Levytska *et al*. (2022) and Ivashkiv *et al*. (2020), who note that the state does not always ensure equal access to financial resources, which negatively affects the agricultural sector.

Another critical issue is access to loans and investments. In Ukraine, many small and medium-sized farms lack sufficient access to financing, which limits their ability to invest in innovation and development. On the other hand, Poland has a more developed credit system that facilitates the quicker adoption of new technologies in agriculture. This is supported by data from Shpykulyak *et al*. (2020), who highlight the importance of developing financial instruments for farmers as a key factor in increasing the efficiency of the agricultural sector. Similarly, in Kazakhstan, the situation with agricultural lending is challenging due to limited access to financial resources for small and medium-sized farmers. However, thanks to state initiatives, particularly through subsidies and specialized credit programs, Kazakhstani farmers have access to financial support, which is gradually improving their investment capacity (Omarkhanova *et al*., 2022).

Cristian and Ivascu (2021) argue that international organizations play a key role in the development of agriculture by providing financial, technical, and scientific support to increase productivity and sustainability in the sector. In particular, the FAO facilitates the implementation of modern methods and sustainable practices, while the World Bank and IFAD (International Fund for Rural Development) finance infrastructure development and modernization projects in the agricultural sector. At the same time, the UN World Food Programme (WFP) provides humanitarian aid in crises, and CGIAR

(Consortium of International Agricultural Research Centers) contributes to the development of new agricultural technologies. The establishment of international standards and promoting adaptation to climate change are also priorities that contribute to global food security.

Technical assistance is an essential component of international cooperation, facilitating the adaptation of global experience to local conditions in the agriculture sectors of Ukraine, Kazakhstan, and Poland. In Ukraine, the focus is on the introduction of resource-saving technologies and modernization of production processes, which enhances the efficiency of the agricultural sector even amidst economic instability. In Kazakhstan, technical assistance is aimed at developing the grain sector infrastructure, optimizing water use, and adapting to climate change, particularly through FAO and World Bank programs. Poland, through active cooperation with the EU, uses technical assistance to introduce digital technologies in agriculture, improve competitiveness in international markets, and comply with sustainable development standards. The participation of these countries in international forums, exhibitions, and training programs fosters the implementation of modern financial, technological, and management tools, strengthening their agricultural positions on a global level.

Regarding the digitalization of agriculture, this process is just gaining momentum in Ukraine. As Ostapenko (2021) notes, for domestic farmers to effectively implement modern digital solutions, it is necessary to improve access to knowledge and technology. In Poland, thanks to a stable policy of supporting innovations and technologies, the agricultural sector is already actively using digital solutions, significantly increasing production efficiency and reducing costs (Rodzinka, Skica and Pomianek 2021). Misiąg, Skica and Rodzinka (2020) also note that digitalization is one of the key factors behind the successful development of the Polish agricultural sector. In Kazakhstan, government programs aimed at implementing modern information technologies in the agricultural sector help improve the efficiency of management processes and ensure more precise planning and monitoring of resources, as confirmed by Suieubayeva *et al*.'s research (2022).

Labor productivity in Ukraine leaves much to be desired, as a significant portion of farming enterprises use outdated equipment, which reduces production efficiency. As Humeniuk *et al*. (2021) note, many small farmers, lacking access to modern technologies, are unable to ensure the necessary mechanization of processes. In Poland, however, the level of mechanization is much higher, which contributes to increased labor productivity. This is supported by Zalewski et al.'s research (2022), which highlights that modern technologies are an important factor in improving the efficiency of the Polish agricultural sector. In Kazakhstan, although the level of mechanization has not yet reached the standards of Poland, there is a recent trend toward the active introduction of new equipment and technologies, which gradually improves labor productivity in agriculture.

Regarding agricultural exports, Ukraine has significant potential, especially in the grain sector. However, geopolitical risks related to the war and other unstable factors create serious problems for the development of agricultural exports. Moldavan *et al*. (2023) note that agricultural exports are an important element of Ukraine's economy, but at the same time, they are vulnerable to external crises. Kazakhstan, on the other hand, has

significant potential for developing the agricultural sector due to its land resources, but due to insufficiently developed infrastructure and limited access to modern technologies, it has not yet been able to fully utilize this potential. Hossain, Atibudhi and Mishra, (2020) emphasize the problems related to the development of agricultural infrastructure in Kazakhstan.

Thus, the study shows that each of the three countries has its strengths and weaknesses in the agricultural sector. Ukraine needs to improve government support and access to financing and new technologies. Poland has advantages due to EU support and the development of innovations. Kazakhstan should focus on improving its infrastructure and developing modern technologies to realize its agricultural potential.

Conclusions

As a result of the analysis of the agricultural sectors of Ukraine, Poland, and Kazakhstan, significant differences were found in the efficiency of financial management and agricultural potential in these countries. Ukraine has the largest total area of agricultural land, amounting to 42 million hectares, which significantly exceeds the agricultural land areas of Poland (14.6 million hectares) and Kazakhstan (23.3 million hectares). This gives Ukraine a significant advantage in the development of agriculture, particularly in grain production, where Ukraine leads with 65 million tons, compared to Poland (30 million tons) and Kazakhstan (18 million tons). However, in the context of agricultural exports, Poland is the leader among these three countries, with export revenues of 35 billion dollars, due to its integration into the European Union. Ukraine exports agricultural products worth 23 billion dollars, while Kazakhstan exports only 5 billion dollars, indicating a smaller scale of agricultural exports. Labor productivity in the agricultural sector also varies significantly: in Poland, it is 25,000 dollars per person, in Ukraine, 10,000 dollars, and in Kazakhstan, 8,000 dollars. Mechanization of agriculture is most developed in Poland, where there are 12 units of machinery per hectare; in Ukraine, this indicator is 5 units per hectare, and in Kazakhstan, it is only 3 units.

In Ukraine, the liquidity ratio ranges between 1.2 and 1.5, indicating an average level of liquidity, while in Poland, this indicator is higher, from 1.8 to 2.2, and in Kazakhstan, 1.3 to 1.6. The financial independence ratio in Ukraine is between 0.4 and 0.5, in Poland, from 0.6 to 0.7, and in Kazakhstan, 0.5 to 0.6. The share of loans in the financing of agricultural enterprises is 25-30% (Ukraine), 40-45% (Poland), and 20-25% (Kazakhstan). The return on assets is 3-5% (Ukraine), 6-8% (Poland), and 4-6% (Kazakhstan). The return on equity ranges between 6-10% (Ukraine), 10-14% (Poland), and 7-11% (Kazakhstan). The return on production in Ukraine is 10-15%, in Poland it is 15-20%, and in Kazakhstan, it ranges from 12-18%.

Thus, Ukraine has the potential to improve financial management through the development of government support and digital technologies, Poland demonstrates high results due to EU integration, and Kazakhstan faces challenges with financing and technology. The practical value of the research lies in the evaluation of the financial efficiency of the agricultural sectors in the three countries and the development of recommendations for improving financial management, specifically through optimizing government support and implementing modern technologies. Future research prospects

include analyzing agricultural cooperatives as a tool for improving access to financing and reducing production costs.

Recommendations

To improving the financial condition of agricultural enterprises in Ukraine, Poland, and Kazakhstan, recommendations include the development of government financial support programs for small and medium-sized agricultural enterprises, which will ease access to loans, investments, and subsidies. To improve the financial condition of agricultural enterprises of Ukraine in the short-term perspective, access to loans should be simplified, and agrarian insurance should be developed. In the average year, «green» bonds, digital financial platforms, and state guarantee mechanisms should be implemented for the sustainable development of the sector. It is important to implement new financial instruments, such as green bonds and agricultural insurance products, to reduce financial risks and support the sustainable development of the agricultural sector.

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Conceived and designed the research or analysis	Yes	No	Yes	Yes	No
Collected the data	No	No	Yes	Yes	Yes
Contributed to data analysis and interpretation	Yes	Yes	No	No	No
Wrote the article/paper	Yes	Yes	No	No	No
Critical revision of the article/paper	No	Yes	No	Yes	No
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